

REPORT DOCUMENTATION PAGE

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36 separate files are enclosed

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MEMORANDUM FOR PRR (Contractor/In-House Publication)

FROM: PROI (TI) (STINFO)

02 Aug 2000

SUBJECT: Authorization for Release of Technical Information, Control Number: **AFRL-PR-ED-TP-2000-159**
Liu, C.T. (AFRL/PRSM); Wang, L., Atluri, S.N. (UCLA), "Analysis of Subinterface Cracks"

International Conference on Computational Science
(Anaheim CA, 21-25 Aug 00)

(Submission Deadline: 16 Aug 00)

(Statement A)

1. This request has been reviewed by the Foreign Disclosure Office for: a.) appropriateness of distribution statement, b.) military/national critical technology, c.) export controls or distribution restrictions, d.) appropriateness for release to a foreign nation, and e.) technical sensitivity and/or economic sensitivity.

Comments: _____

Signature _____ Date _____

2. This request has been reviewed by the Public Affairs Office for: a.) appropriateness for public release and/or b) possible higher headquarters review.

Comments: _____

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3. This request has been reviewed by the STINFO for: a.) changes if approved as amended, b.) appropriateness of distribution statement, c.) military/national critical technology, d.) economic sensitivity, e.) parallel review completed if required, and f.) format and completion of meeting clearance form if required

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4. This request has been reviewed by PR for: a.) technical accuracy, b.) appropriateness for audience, c.) appropriateness of distribution statement, d.) technical sensitivity and economic sensitivity, e.) military/national critical technology, and f.) data rights and patentability

Comments: _____

APPROVED/APPROVED AS AMENDED/DISAPPROVED

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Analysis of Subinterface Cracks

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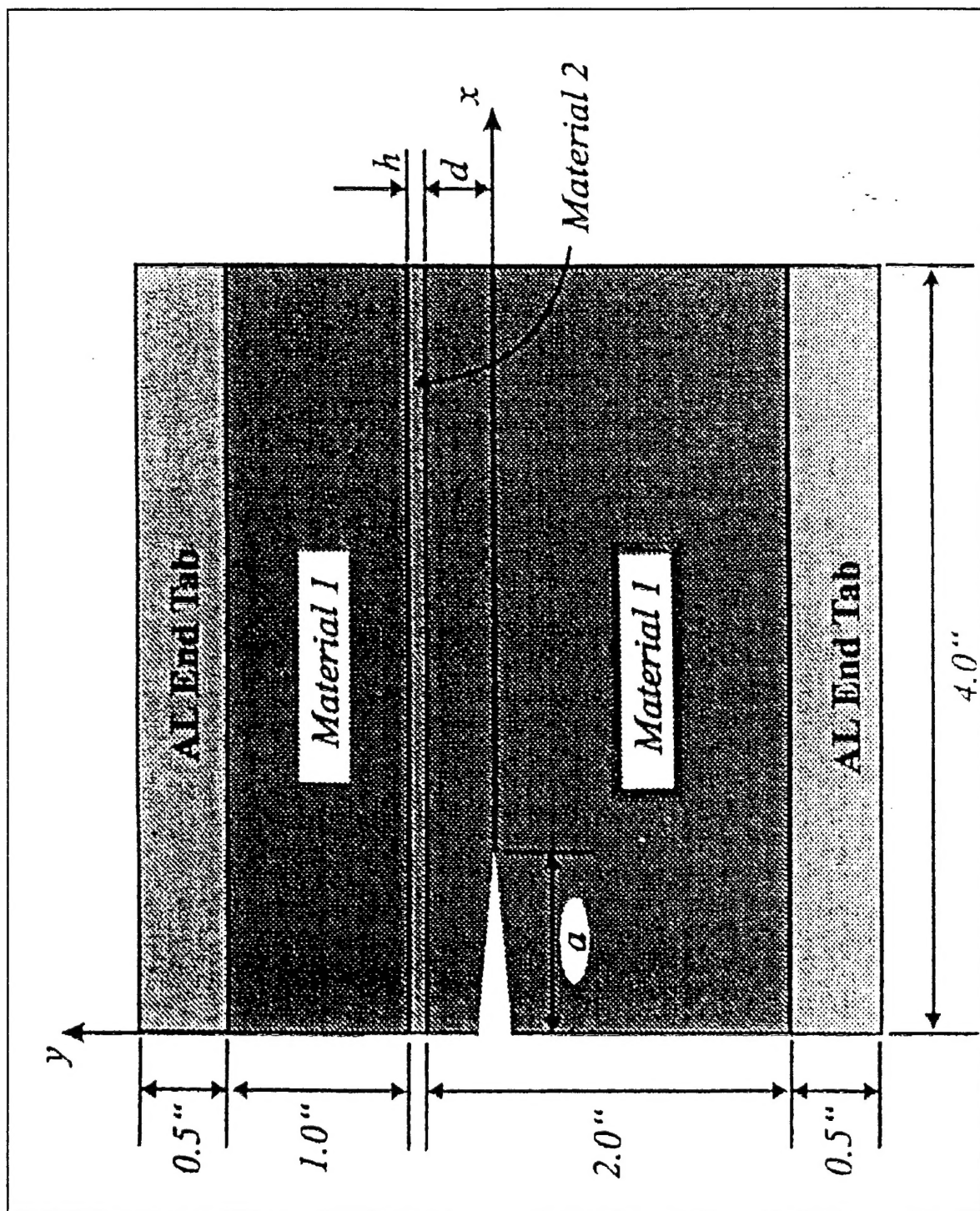
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Distribution Statement: Cleared for Public Release



Objectives

- **Determine the Accuracy of the Numerical Modeling Results.**
- **Investigate the Effects of (a) Crack Length and Location and (b) Adhesive Layer Thickness and Material property on Mode I Stress Intensity Factor.**

Specimen Geometry





Definitions of the Analyzed Cases

No.	E (ksi)	h (in)	d (in)	a (in)
1	700	0.10	0.15	0.10
2	700	0.10	0.15	0.50
3	100	0.05	0.15	0.10
4	100	0.05	0.15	0.50
5	100	0.05	0.30	0.10
6	100	0.05	0.30	0.10
7	100	0.20	0.15	0.10
8	100	0.20	0.15	0.50
9	100	0.20	0.30	0.10
10	100	0.20	0.30	0.50
11	1000	0.05	0.15	0.10
12	1000	0.05	0.15	0.50
13	1000	0.05	0.30	0.10
14	1000	0.05	0.30	0.50
15	1000	0.20	0.15	0.10
16	1000	0.20	0.15	0.50
17	1000	0.20	0.30	0.10
18	1000	0.20	0.30	0.50



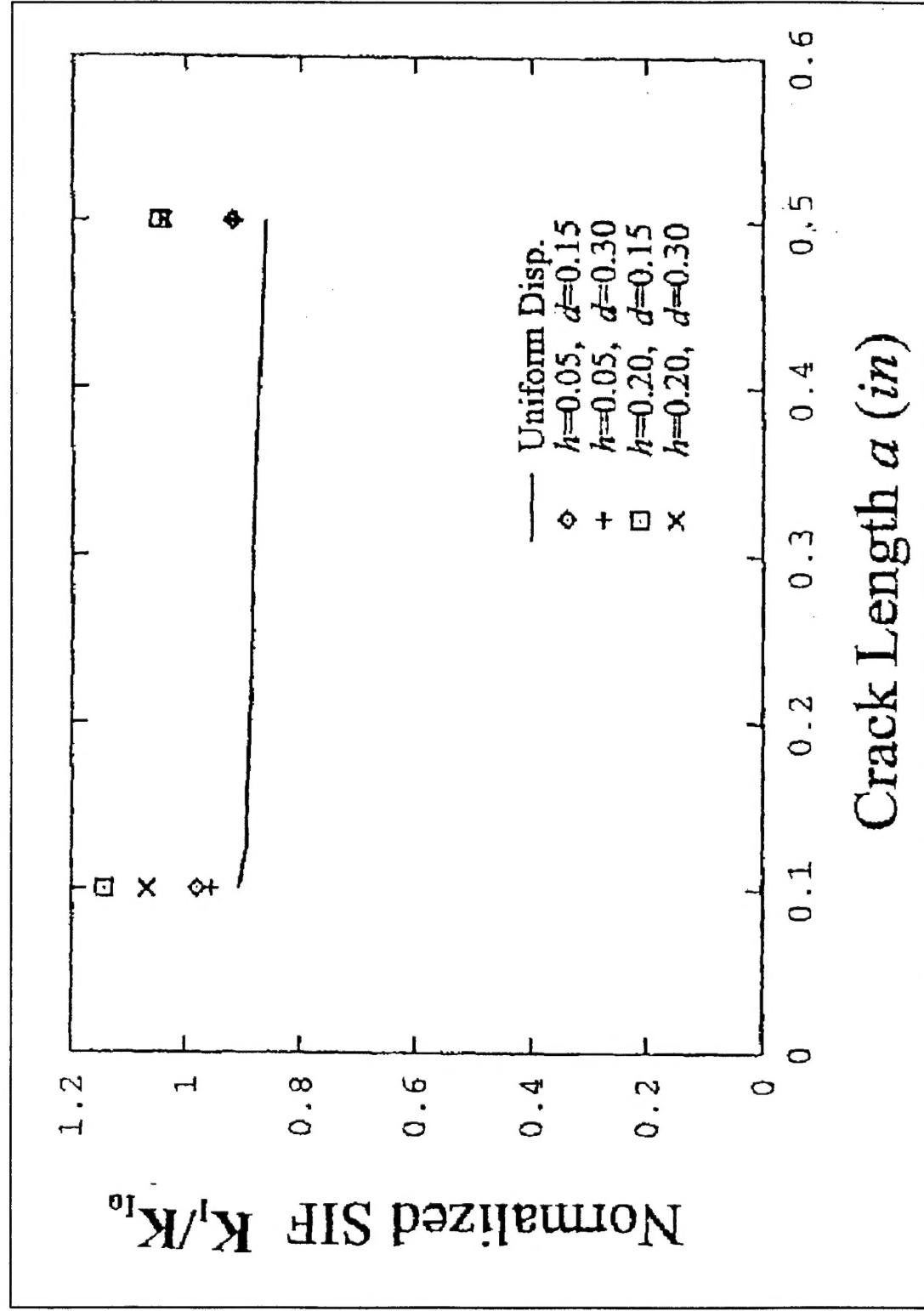
Summary of the Analyzed Cases

No.	E (ksi)	h (in)	d (in)	a (in)	K/K _o
1	700	0.10	0.15	0.10	0.8958
2	700	0.10	0.15	0.50	0.8702
3	100	0.05	0.15	0.10	0.9795
4	100	0.05	0.15	0.50	0.9187
5	100	0.05	0.30	0.10	0.9551
6	100	0.05	0.30	0.10	0.9134
7	100	0.20	0.15	0.10	1.1429
8	100	0.20	0.15	0.50	1.0478
9	100	0.20	0.30	0.10	1.0687
10	100	0.20	0.30	0.50	1.0401
11	1000	0.05	0.15	0.10	0.8918
12	1000	0.05	0.15	0.50	0.8636
13	1000	0.05	0.30	0.10	0.9083
14	1000	0.05	0.30	0.50	0.8648
15	1000	0.20	0.15	0.10	0.8972
16	1000	0.20	0.15	0.50	0.8699
17	1000	0.20	0.30	0.10	0.9137
18	1000	0.20	0.30	0.50	0.8720



Normalized SIF Versus Crack Length

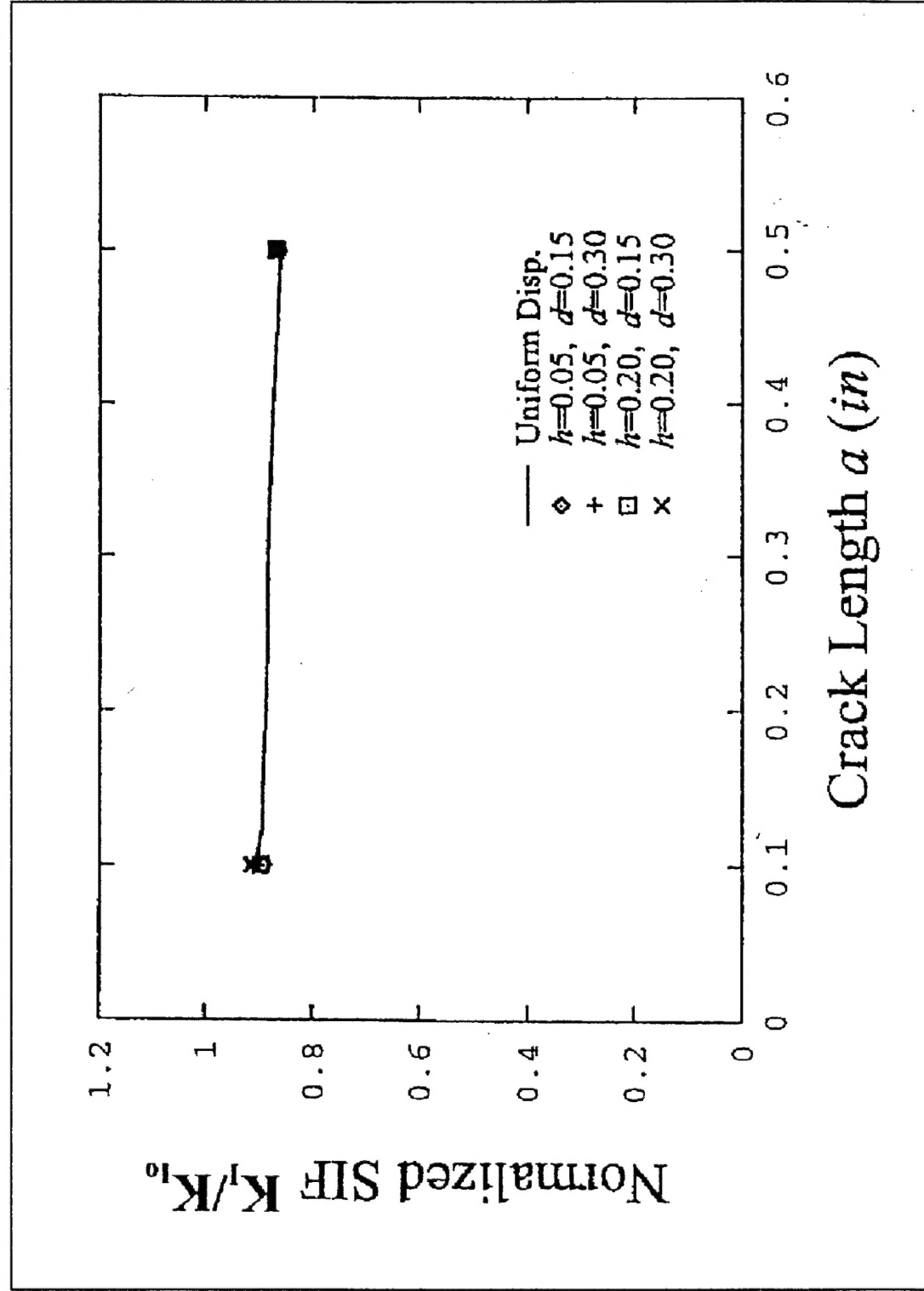
(adhesive layer is softer than material 1)





Normalized SIF Versus Crack Length

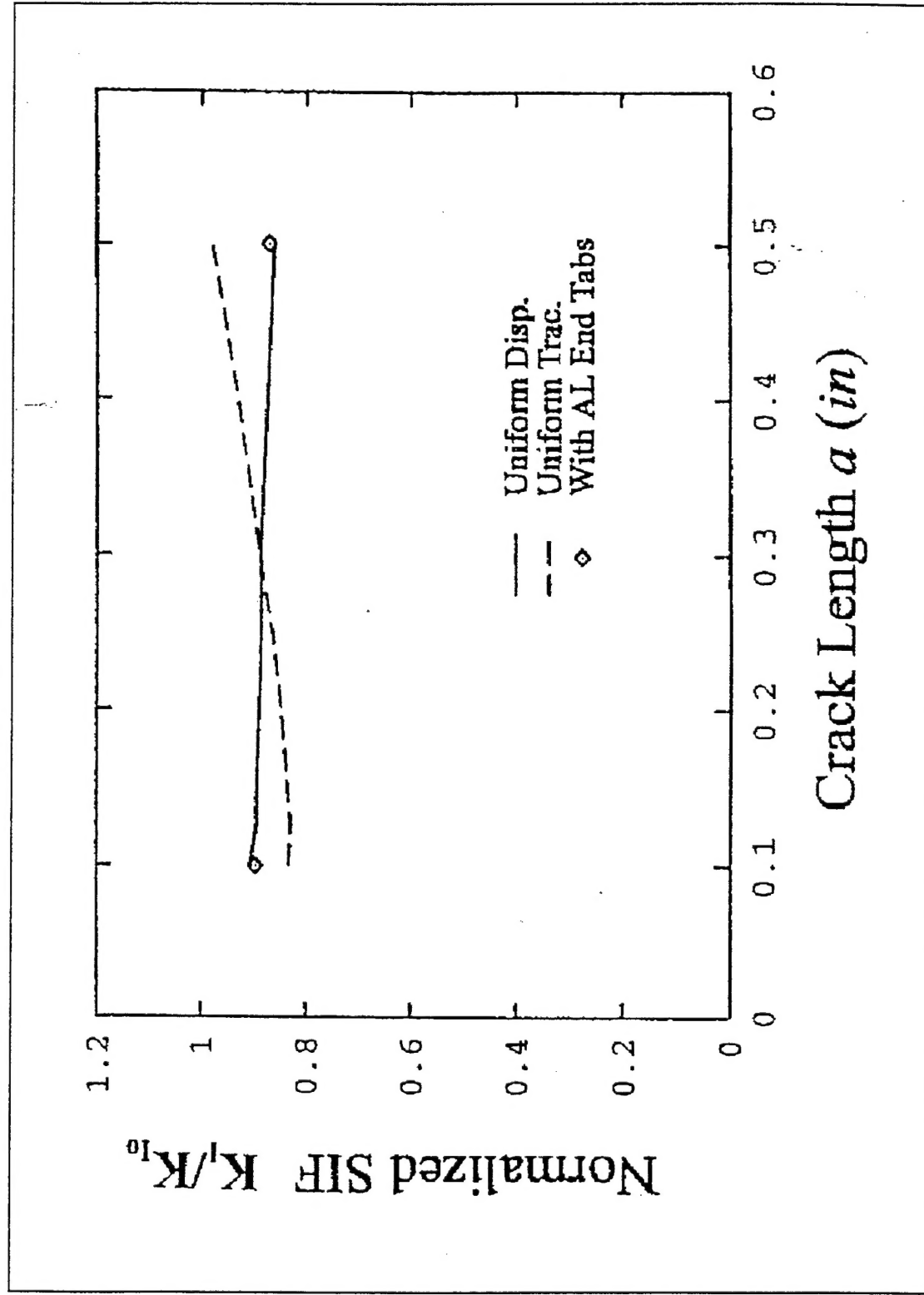
(adhesive layer is stiffer than material 1)





Normalized SIF Versus Crack Length

(adhesive layer has same material property as material 1)





Conclusions

- For all the cases analyzed, the Mode II stress intensity factor is negligibly small.
- By comparing with the homogeneous specimen, a softer (stiffer) adhesive layer has a significant (insignificant) effect on the normalized Mode I stress intensity factor, ^{whereas a stiffer layer has an insignificant effect.} ^{* in correct use of parentheses}
- For a soft adhesive layer, the normalized Mode I stress intensity factor increases with increasing the thickness of the adhesive layer.
- For a stiffer adhesive layer, the normalized stress intensity factor is insensitive to the thickness of the adhesive layer.